Gestational Diabetes Mellitus in Teenage Pregnancy: a Case-control Study

T.T. Lao*, L.F. Ho, K.L. Liu

Department of Obstetrics and Gynaecology, Tsan Yuk Hospital, Hong Kong, China

In a retrospective study, teenage Asian pregnancies with gestational diabetes managed over a 4-year period were compared with a group of age and parity matched controls (2 for each study case) to determine the incidence of gestational diabetes and its impact on the pregnancy outcome. The incidence of gestational diabetes in teenage pregnancy was 5.4 % (33/611), and accounted for 1.4 % of all the cases of gestational diabetes. There was no difference in the maternal anthropometric parameters or antenatal complications, but the study group had a higher incidence of postpartum haemorrhage ($p = 0.010$), greater amount of estimated blood loss at delivery ($p = 0.016$), a trend towards a higher incidence of large-for-gestational age infants, a higher incidence of admission to the neonatal unit ($p = 0.024$), mostly due to meconium-stained liquor for observation ($p = 0.014$), and a lower first minute Apgar score ($p = 0.012$). Our findings support the recommendation that in ethnic groups with a high prevalence of diabetes, universal as opposed to age-limited screening for gestational diabetes should be undertaken. © 1998 John Wiley & Sons, Ltd.

Diabet. Med. **15: 1036–1038 (1998)**

KEY WORDS **Asian; teenage pregnancy; gestational diabetes mellitus; outcome**

Received 19 December 1997; revised 24 July 1998; accepted 27 July 1998

Introduction

Recently, the American Diabetes Association recommended an age cut-off of 25 below which screening for gestational diabetes mellitus (GDM) is not warranted, unless the women are obese, have a positive family history, or belonged to an ethnic group with a high prevalence of diabetes.[1] Although Asian women have the highest incidence of GDM,[2–4] there were no data on whether universal screening is appropriate in this group or not. A retrospective case-control study was therefore performed on our Asian teenage pregnancies, defined as a maternal age at delivery of 19 years or under, managed over a 4-year period in our hospital, to address this issue.

Patients and Methods

In our hospital, a 75g oral glucose tolerance test (OGTT), interpreted by the World Health Organization criteria,[5] is performed after booking on the mothers with risk factors such as obesity (>75kg at booking), family history of diabetes mellitus, past history of gestational diabetes mellitus or macrosomic infant (≥4.0 kg). In addition, routine blood sampling is performed at the 28–30 week visit for random glucose estimation. Those with elevated values (≥5.8 mmol l^{-1} within 2 h postprandial and ≥ 5.0 mmol l^{-1} more than 2 h postprandial) were subjected to a 75g OGTT as described previously.[6] Those with an abnormal result are managed initially by diet treatment (30 kcal kg^{-1}), and failing this, insulin, with the aim to keep the 2-h postprandial blood sugar level <7.0 mmol l^{-1}.

In a retrospective study, the case records of all teenage mothers carrying singleton pregnancies and diagnosed to have GDM (Study Group), who were delivered between 1993 and 1996, were reviewed. For each study case, two controls matched for parity and age were selected from the remaining teenage mothers who had regularly attended the clinic, who had normal random glucose or OGTT ($n = 20$) results, and who delivered within the same period. Comparison was made in the maternal anthropometric parameters, the haemoglobin value (as an indicator of maternal nutrition) and fetal outcome. Statistical analysis was performed with the chi-square or Fisher's exact test, Student's *t*-test and Mann-Whitney U test where appropriate, using a commercial statistical package (SPSS).

Results

Of the 611 teenagers who delivered within this period, which accounted for 3.2 % of the total deliveries, 33 (5.4 %) had GDM, all of whom belonged to the WHO non-pregnant category of impaired glucose tolerance. These cases accounted for 1.4 % of all the cases of

* Correspondence to: Dr Terence Lao, Department of Obstetrics and Gynaecology, Tsan Yuk Hospital, 30 Hospital Road, Hong Kong, China

 CCC 0742–3071/98/121036–03$17.50

GDM. The prevalence of GDM in the entire obstetric population in these years varied from 8.6 % to 11.9 %. The major indications for OGTT in the Study and Control Groups were increased random glucose (87.9 % and 90.0 %) and family history (9.1 % and 10 %).

The mean age was 17.8 (range 13 to 19) years. There was no difference in the maternal height, weight, gestational weight gain, body mass index (BMI), the haemoglobin value at booking or 28–30 weeks, or the incidence of the major antenatal complications (Table 1). Although the incidences of spontaneous labour (90.9 % vs 86.4 %), and caesarean delivery (6.1 % vs 4.5 %) were similar, the incidence of instrumental delivery was almost double in the Study Group (29.0 % vs 15.9 %). This did not reach statistical significance. The incidence of postpartum haemorrhage (12.9 % vs 0 %, $p = 0.010$) and the mean blood loss at delivery (322 ± 144 ml vs 252 ± 193 ml, $p = 0.016$) were increased in the Study Group.

Although there was no difference in the gestational age, birthweight, or crown–heel length of the infants, the Study Group had a higher (though not statistically significant) incidence of large-for-gestational age (LGA) infants (Fisher's exact test comparing proportion of LGA vs non-LGA infants, $p = 0.139$) and increased perinatal morbidity as reflected by the admissions to the neonatal unit ($p = 0.04$, Table 2). However, there was no serious morbidity and no mortality in both groups.

Discussion

In the literature, the incidence of GDM in teenagers is between 1.4 %[7] and 3.4 %,[8] while teenagers, those aged <24 and <25 account for 5.6 %,[2] 8.3 %[4] and 21 %[9] of the GDM cases, respectively. Thus an age limit of 24[10] or 25[1] may not be appropriate universally. In this series, although the teenagers accounted for only 1.4 % of the GDM pregnancies, the incidence of GDM amongst the teenagers was 5.4 %, compared with 8.6 %–11.9 % in our overall obstetric population, and was higher than the reported figures.

In contrast to previous studies,[6,8] obesity did not appear to be a significant aetiological factor in this study. However, there was a trend for increased maternal and perinatal morbidity in the teenagers with GDM. Furthermore, this group of teenagers are highly likely to have future pregnancies and are therefore at higher risk of future diabetic pregnancies. Although our sample size was limited, the findings nevertheless support the American Diabetes Association's recommendation of screening for GDM in women belonging to a high prevalence ethnic group for diabetes irrespective of age.[5]

Table 1. Maternal demographics in the Study and Control Groups

	Study Group ($n = 33$)	Control Group ($n = 66$)	p
Height (cm)	156.3 ± 5.4	156.6 ± 5.6	NS
Weight (kg)			
Pre-pregnant	49.6 ± 9.2	49.5 ± 6.7	NS
Pre-delivery	63.1 ± 10.9	64.6 ± 9.6	NS
Weight gain	12.7 ± 4.0	15.1 ± 6.9	NS
Body mass index (kg m^{-2})			
Pre-pregnant	20.1 ± 2.9	20.4 ± 2.6	NS
Pre-delivery	25.6 ± 3.8	26.4 ± 3.2	NS
Haemoglobin (g dl^{-1})			
Booking	11.9 ± 1.1	11.6 ± 1.0	NS
Third trimester	11.5 ± 1.1	11.4 ± 0.8	NS
Smokers[a]	7 (21.2)	17 (25.8)	NS
Antepartum haemorrhage[a]	1 (3.0)	1 (1.5)	NS
Pre-eclampsia[a]	1 (3.0)	6 (9.1)	NS
Preterm labour (<37 weeks)[a]	5 (15.2)	8 (12.1)	NS

Results in mean ± SD or [a]number (%).

Table 2. Infant outcome in Study and Control Groups

	Study Group ($n = 33$)	Control Group ($n = 66$)	p
Gestational age (weeks)	38.6 ± 2.5	38.7 ± 1.9	NS
Birthweight (g)	3102 ± 564	3061 ± 415	NS
Small-for-dates[a]	1 (3.0)	6 (9.1)	NS
Large-for-dates[a]	6 (18.2)	7 (10.6)	NS
Crown–heel length (cm)	49.2 ± 2.4	48.8 ± 2.4	NS
Apgar score			
1 min	8.2 ± 1.4	8.9 ± 0.9	0.012
5 min	9.6 ± 0.7	9.9 ± 0.4	NS
Admitted neonatal unit[a]	7 (21.2)	4 (6.1)	0.024
Indications			
Prematurity	3 (9.1)	2 (3.0)	NS
Meconium stained liquor	5 (15.2)	1 (1.5)	0.014
Sepsis	1 (3.0)	1 (1.5)	NS
Phototherapy	1 (3.0)	0	NS
Hypocalcaemia	0	1 (1.5)	NS

Results expressed in mean ± SD or [a]number (%).

References

1. American Diabetes Association. Gestational diabetes mellitus. *Diabetes Care* 1998; **21** (suppl 1): S60–S61.
2. Green JR, Pawson IG, Schumacher LB, Perry J, Kretchmer N. Glucose tolerance in pregnancy: ethnic variation and influence of body habitus. *Am J Obstet Gynecol* 1990; **163**: 86–92.
3. Dornhorst A, Paterson CM, Nicholls JSD, *et al*. High prevalence of gestational diabetes in women from ethnic minority groups. *Diabetic Med* 1992; **9**: 820–825.
4. Ma J, Bauman A. Obstetric profiles and pregnancy outcomes of immigrant women in New South Wales, 1990–1992. *Aust NZ J Obstet Gynaecol* 1996; **36**: 119–125.
5. Lao TT, Lee CP. Gestational 'impaired glucose tolerance' – should the cutoff be raised to 9 mmol l^{-1}? *Diabetic Med* 1998; **15**: 25–29.
6. World Health Organization Expert Committee on Diabetes

Mellitus. *Diabetes Mellitus*. Technical Report Series No. 646. Geneva: World Health Organization, 1980: 8–12.
7. Truscello AM, Hollingsworth DR, Felice ME, Shragg P. Routine screening for gestational diabetes in White, Black, and Mexican-American teenagers. *J Adolesc Health Care* 1988; **9**: 150–155.
8. Mestman JH. Outcome of diabetes screening in pregnancy and perinatal morbidity in infants of mothers with mild impairment in glucose tolerance. *Diabetes Care* 1980; **3**: 447–452.
9. Gillmer MDG, Oakley NN, Beard RW, Nithyananthian R. Screening for diabetes during pregnancy. *Br J Obstet Gynaecol* 1980; **87**: 377–382.
10. Marquette GP, Klein VR, Repke JT, Niebyl JR. Cost-effective criteria for glucose screening. *Obstet Gynecol* 1985; **66**: 181–184.